9.5 OTHER AUXILIARY SYSTEMS

9.5.1 FIRE PROTECTION SYSTEM

The Fire Protection System (FPS) is designed to detect fires, protect the plant against damage from fire, minimize hazards to personnel, and reduce property loss. This system description relates only to components of the site FPS outside the Standard Power Block.

9.5.1.1 Design Basis

9.5.1.1.1 Safety Design Basis

SAFETY DESIGN BASIS ONE - The FPS is designed to prevent, detect, and extinguish fires that could indirectly or directly affect structures, systems and components required for safe shutdown. Non-Category I site buildings and facilities are sufficiently remote from the Standard Power Block and Site Category I facilities to minimize the effects of fires in these areas on Category I facilities.

SAFETY DESIGN BASIS TWO - A single failure in the FPS will not impair fire suppression capability.

SAFETY DESIGN BASIS THREE - FPS components are designed so that their failure or inadvertent operation does not cause the loss of function of plant structures, systems and components important to safety.

9.5.1.1.2 Power Generation Design Basis

POWER GENERATION DESIGN - The FPS is designed to detect the occurrence of fire and/or to mitigate the consequences of fire in plant structures, systems and components related to power generation.

9.5.1.1.3 Codes and Standards

The following codes and standards are used as guidelines in the design of the Fire Protection System and Equipment, and where required by law, the system and equipment conform to the applicable standards.

a. National Fire Protection Association (NFPA)

b. Nuclear Energy Liability Property Insurance Association (NEL-PIA), April, 1976 NEL-PIA is now American Nuclear Insurers (ANI).

c. Occupational Safety and Health Standards (OSHA) October 1972.

9.5.1.2 System Description

9.5.1.2.1 General Description

The layout and flow diagram of the FPS outside the Standard Power Block is shown on Figures 9.5-1 and 9.5-2. A comparison of the Callaway Site design with NRC Branch Technical Position, APCSB 9.5-1, Appendix A is presented in Appendix 9.5-A. The fire hazards analysis for the site facilities outside the Standard Power Block which could affect safe shutdown structures, systems, and components is contained in Appendix 9.5-B.

The FPS water supply is separated from all other site water supply systems and is based on providing 2300 gallons per minute of water for two hours to sprinkler systems with a simultaneous total flow of 1000 gallons per minute to hose stations.

Three 1500 gallons per minute fire pumps are provided. Two are diesel-driven and one has an electric drive. Any two of the three fire pumps are capable of providing 3300 gallons per minute of water to the fire system, with the shortest portion of the fire loop out of service, with sufficient head to meet the 80 psig interface pressure requirement at the Power Block. A jockey pump is provided to maintain normal system pressure when the fire pumps are not in operation.

9.5.1.2.2 Component Description

The site portion of the FPS consists of the following principal components:

a. Two separate 300,000 gallon maximum capacity tanks are furnished. The tanks are interconnected so that three pumps can take suction from either/or both of the tanks. Check valves are provided so that a leak in one tank or its supply piping does not cause both tanks to drain.

b. Each fire water tank is capable of providing for a period of two hours the maximum water demand for any safe shutdown area. This is based on 1,160 gpm to the largest safe shutdown area (10CFR50, Appendix R requirement).

c. The Fire Protection System water storage is not interconnected with any sanitary or service water storage systems.

d. The fire water supply system is not common with any other system. (Note: Hose stations in the ESW pumphouse are supplied by ESW/SW.)

e. The fire-water pumping station consisting of one motor-driven pump and two diesel-driven pumps each rated at 1500 gpm and 347 ft. TDH.

f. A 14" diameter underground yard loop around the Standard Power Block with branches to each building as shown on Figure 9.5-1. The fire loop is sectionalized by means of Post Indicating Valves (PIV) to isolate portions of the main for maintenance or repair without shutting off the entire system.

g. Two-way hydrants located approximately every 250 feet on the yard fire loop. Fire fighting equipment is supplied by two mobile units, each equipped with 750 feet of 1 1/2" hose, 300 feet of 2 1/2" hose, 6 - 1 1/2" spray nozzles, 3 axes, 6 hydrant wrenches, 12 spanners, 6 - 1 1/2" hose gaskets, and 6 - 2 1/2" hose gaskets.

The lateral to each hydrant from the fire main is furnished with a curb valve, for isolation of damaged hydrants without reducing the effectiveness of the supply system.

Fire hoses in safety-related areas are tested at 250 PSI or at the service test pressure stenciled on the hose. The interior standpipe hoses are tested 5 years from installation and three years thereafter. Fire hoses stored outside are not required to ensure nuclear safety or safe shutdown of the plant, as documented by the fact that standard Plant FSAR Table 9.5.1-2 does not address outside hose.

9.5.1.2.3 System Operation

The fire water storage tanks are filled from the clarified water supply or deep well. The requirement for an eight-hour refill of one tank is met with clarified water from the Water Treatment Plant. The fire pump piping configuration provides for suction from either or both storage tanks.

The FPS water supply is capable of meeting the maximum automatic sprinkler or fixed water spray demand of 2300 gpm to the turbine building with simultaneous flow of 1000 gpm for hose streams and the shortest portion of the fire loops main out of service (Branch Technical Position APCSB 9.5-1 requirement). The FPS water supply provides this flow of 3300 gpm with sufficient head to meet the 80 psig interface pressure requirement at the Power Block.

Fire pumps are arranged to start automatically when the yard fire loop pressure drops below the pressure maintained by the jockey pump. The motor-driven pump is arranged to start first followed by the diesel-driven pumps. Pumps are stopped locally only. Manual start controls are provided at each pump and in the Power Block Control Room.

A fire alarm system is provided, compromised of ionization, photo electric, and heat detectors and manual pull boxes (located in substantial compliance with Article 310 of NFPA-72A, 1974), fire pump alarms and sprinkler operation alarms with signals to the Control Room annunciators.

Fire pump alarms include, as a minimum, controller not in Auto Mode (diesel driven pump only), pump running, power failure (electric driven pump only) and failure-to-start indicator. In addition, each diesel engine has a malfunction alarm. The fire-water tanks include level and temperature alarms.

9.5.1.2.4 Off Site Assistance

The Callaway Plant is designed to be self-sufficient with respect to fire fighting activities. No reliance is placed on help from local fire departments.

9.5.1.2.5 Provisions for Construction Support Facilities

Prior to plant operation, the permanent fire protection system will be complete including the fire loop around the Power Block, service to the Power Block, pump capacity, water storage and supply, hydrants, hose houses, post indicating valves and fire alarm system.

The construction FPS will be interconnected to the permanent fire protection system through isolation valves. A fire-water main distributes water to hydrants, hose stations, and sprinklers located at various construction facilities.

9.5.1.3 Safety Evaluation

Safety evaluations are numbered to correspond to the safety design bases.

SAFETY EVALUATION ONE - By virtue of the location and construction of site facilities, the possibility of fires and the potential effects on Category I facilities are minimized. Refer to Appendix 9.5-B. Provisions embodied into the design of Non-Category I site facilities include:

a. Service Building: An automatic wet-pipe sprinkler system is used in the consumable storage area, a pre-action sprinkler system is used in the QA record storage area and standpipe fire hose systems are provided throughout the building, supplemented by portable extinguishers.

b. Stores Building: A Halon 1301 automatic system is used in the radiograph storage area with the remainder of the building having an automatic wet-pipe sprinkler system with standpipe fire hose systems provided throughout, supplemented by portable extinguishers.

c. Auxiliary boiler fuel oil storage tank: Spread of fire is prevented by a containment dike.

d. Circulating water cooling towers: non-combustible construction with flame-resistant fill material.

e. Compressed gas storage: Outdoors, located to prevent accident effects on safety-related facilities.

SAFETY EVALUATION TWO - Two separate 300,000 gallon capacity fire-water storage tanks are provided. The tanks are interconnected so the pumps can take suction from either/or both of the tanks. Check valves are provided so that a leak in one tank or its supply will not allow both tanks to drain.

Three 50% capacity fire pumps are provided, (one-driven electrically and two diesel-driven). Failure of one pump to operate does not prevent the system from supplying 100% design flow. Connection to the yard fire main loop is through two supply lines from opposite sides of the fire pump house.

SAFETY EVALUATION THREE - The site FPS consists of proven components selected to minimize risks of failure or inadvertent operation. Extinguishing materials used are compatible with the equipment in the areas served.

9.5.1.4 Tests and Inspections

The fire protection systems are installed by a contractor qualified and experienced in the work. Tests and inspection of this installation are performed in accordance with the requirements of the agencies listed in Section 9.5.1.1.3 (except the frequency of periodic fire pump testing will be as required by Table 9.5.1-2 of the Standard Plant FSAR in lieu of NFPA Codes) and with Preoperational Test Procedures. To insure system integrity and completeness refer to Site Addendum Appendix 9.5A for further discussion.

9.5.1.5 Personnel Qualification and Training

The Site Architect/Engineers' Supervisor of fire protection design assisted in the development, design and equipment specification for the Fire Protection System. He was a member of the Society of Fire Protection Engineers and is a Registered Professional Engineer.

The Nuclear Engineering Fire Protection Engineer is responsible for formulation and implementation of the Fire Protection Program. This person shall have completed not less than six years of engineering attainment indicative of growth in engineering competency and achievement, three of which shall have been in responsible charge of fire protection engineering work. These requirements are the eligibility requirements as a Member in the Society of Fire Protection Engineers.

The Manager, Nuclear Engineering, is responsible for the overall Fire Protection Program which includes development and conduct of the Fire Brigade Training Program and the Fire Extinguisher

Training Program for the plant. He is assisted by individuals knowledgeable in fighting the types of fires that could occur within the plant and in the use and maintenance of fire extinguishers.

9.5.1.6 Callaway Plant Fire Protection Program

The Callaway Plant Fire Protection Program is established to ensure that a fire will not prevent safe shutdown of the plant and will not endanger the health and safety of the public. Fire protection at the Callaway Plant uses a defense-in-depth concept which includes fire detection, extinguishing systems and equipment, administrative controls and procedures, and trained personnel.

9.5.1.7 Responsibilities

9.5.1.7.1 Manager, Nuclear Engineering

The Manager, Nuclear Engineering, is responsible for the overall Fire Protection Program and has the authority to delegate responsibility or obtain assistance to ensure the requirements listed below are met. Positions receiving delegated responsibility or providing assistance are described in Callaway Plant Administrative Procedures.

The Manager, Nuclear Engineering, is responsible for the following:

1. Ensuring that programs and periodic inspections are implemented to:
    a. Minimize the amount of combustibles in safety-related areas
    b. Determine the effectiveness of housekeeping practices
    c. Assure the availability and acceptability of the following:
        i Fire Protection Systems and Components
        ii Manual Fire Fighting Equipment
        iii Emergency breathing apparatus
        iv Emergency Lighting
        v Communication Equipment
        vi Fire Barriers, which include:
            • Fire rated walls, floors, & ceilings

- Fire rated assemblies, such as doors, dampers, seals, etc., that allow penetration of a fire rated wall, floor, or ceiling
- Fire stops and wraps
- Fire retardant coatings

d. Assure prompt and effective corrective actions are taken to correct conditions adverse to fire protection and preclude their recurrence.

2. Ensuring that periodic maintenance and testing of fire protection systems, components, and manual fire fighting equipment is conducted, test results are evaluated, and the acceptability of systems under test is determined in accordance with established plant procedures.

3. Designing and selecting equipment related to Fire Protection.

4. Reviewing and evaluating proposed work activities to identify potential transient fire loads.

5. Managing the Callaway Plant Fire Brigade. This includes.

   a. Developing, implementing, and administering the Fire Brigade Training Program.

   b. Scheduling and conducting fire brigade drills.

   c. Critiquing fire drills to determine how well training objectives are met.

   d. Performing a periodic review of the fire brigade roster and initiating changes as needed.

   e. Maintaining fire training program records for members of the fire brigade and other plant personnel.

   f. Ensuring that sufficient fire brigade personnel are identified at the beginning of each shift.

6. Developing and conducting the Fire Extinguisher Training Program.

7. Implementing a program for indoctrination of all personnel gaining unescorted access to the protected area in appropriate procedures which implement the fire protection program.

8. Implementing a program for instruction of personnel on the proper handling of accidental events such as leaks or spills of flammable materials that are related to fire protection.

9. Preparing procedures to meet possible fire situations in the plant, and for assuring assistance is available for fighting fires in radiological controlled areas.

10. Implement a program that controls and documents inoperability of fire protection systems and equipment. This program should also initiate proper notifications and compensatory actions when inoperability of any Fire Protection system or component is identified.

11. Developing and implementing preventive maintenance, corrective maintenance, and surveillance test Fire Protection procedures.

12. Ensuring plant modifications, new procedures and revisions to procedures associated with fire protection equipment and systems that have significant impact on the Fire Protection Program are reviewed by an individual who possesses the qualifications of the Nuclear Engineering Fire Protection Engineer as stated in section 9.5.1.5.

9.5.1.8 Callaway Plant Fire Brigade

The response capabilities of local public fire departments have been analyzed to determine their ability to support the Callaway Plant fire brigade and results have shown them to be capable of making only a minor contribution to the overall fire fighting effort. Because of this fact, the Callaway Plant has been designed to be self-sufficient with respect to fire fighting activities. Reliance on public fire departments for backup support has been excluded from the Fire Protection Program, although some arrangements with local departments may be made to provide additional backup and support for other company properties.

The Callaway Plant fire brigade is organized to deal with fires and related emergencies which could occur. The fire brigade consists of a Fire Brigade Leader and a 4-man fire team. Fire team size is consistent with the equipment that must be put into service during a fire emergency. Each fire team has a designated fire team leader, assistant fire team leader, and fire team members.

Members of each shift crew receive fire brigade training and are therefore qualified members of the Callaway Plant fire brigade. A site Fire Brigade of at least five members shall be maintained onsite at all times. There may be less than five members for a period of time not to exceed two hours in order to accommodate unexpected absence provided immediate action is taken to fill the required positions. The Fire Brigade shall not include the Shift Supervisor and the other members of the minimum shift crew necessary for safe shutdown of the unit and any personnel required for other essential functions during a fire emergency. Qualified personnel are assigned in accordance with

established procedures to the fire brigade by the Operating Supervisor at the beginning of each shift.

The Fire Brigade Leader and at least two brigade members per shift shall have sufficient training in, or knowledge of plant safety-related systems to understand the effect of fire and fire suppressants on safe shutdown capacity. One of these two brigade members is designated the Assistant Fire Brigade Leader.

The minimum equipment provided for the Callaway Plant Fire Brigade consists of personal protective equipment such as turnout coats, boots, gloves, helmets, emergency communications equipment, portable lights, portable ventilation equipment and portable extinguishers.

Self-contained breathing apparatus approved by NIOSH (National Institute of Occupational Safety and Health) are provided for selected fire brigade, emergency repair team and control room personnel. Rated operating life for self-contained units is one-half hour. At least 10 masks are available for Fire Brigade personnel.

Two extra air bottles are provided for each self-contained breathing unit to be used by Fire Brigade, Emergency Repair Team, or Control Room Personnel. An additional on-site 6-hour supply of reserve air is provided to permit quick and complete replenishment of exhausted supply air bottles.

The on-duty Operating Supervisor is designated as the Fire Brigade Leader. The Shift Supervisor has overall responsibility for the following actions based upon assessment of the magnitude of the fire emergency:

1. Recommendations for safe shutdown of the plant if required.

2. Recommendations for implementation of the Emergency Plan.

3. Notification of the Emergency Duty Officer.

4. Requesting assistance from off-duty personnel, if necessary.

If a decision is made to implement the Radiological Emergency Response Plan, the Shift Supervisor is designated the Onsite Emergency Coordinator until relieved by the Emergency Duty Officer or a designated alternate.

To qualify as a member of the Callaway Plant Fire Brigade an individual must meet the following criteria:

1. He is available to answer fire alarms.

2. He has attended the required training sessions for the position on the Fire Brigade he occupies.

3. He shall pass an annual physical examination.

9.5.1.8.1 Fire Brigade Training

A training program is established to assure that the capability to fight fires is developed and documented. The program consists of classroom instruction supplemented with periodic classroom retraining, practice in fire fighting, and fire drills. Classroom instruction and training is conducted by qualified individuals knowledgeable in fighting the types of fires that could occur within the plant and its environs and using on-site fire fighting equipment.

9.5.1.8.1.1 Classroom Instruction

Fire brigade members receive classroom instruction in fire protection and fire fighting techniques, prior to qualifying as members of the fire brigade. This instruction includes:

1. Identification of flammable materials and substances along with their location within the plant and its environs.

2. Identification of the types of fires that could occur within the plant and its environs.

3. Identification of the location of onsite fire fighting equipment and familiarization with the layout of the plant including ingress and egress routes to each area.

4. The proper use of onsite fire fighting equipment and the correct method of fighting various types of fires, such as electrical fires, cable and cable tray fires, hydrogen fires, flammable liquid fires, waste/debris fires, fires involving radioactive materials, and record file fires.

5. Review of Callaway Fire Protection Program with coverage of each individual's responsibilities.

6. Proper use of communication, lighting, ventilation, and emergency breathing equipment.

7. Direction and coordination of fire fighting activities (fire brigade leaders only).

8. Toxic and radiological characteristics of expected products of combustion.

9. Proper methods of fighting fires inside buildings and confined spaces.

10. Review of fire fighting procedures and procedure changes.

11. Review of fire protection-related plant modifications and changes in fire fighting plans.

9.5.1.8.1.2 Retraining

Classroom refresher training is scheduled on a biennial basis to assure retention of initial training.

9.5.1.8.1.3 Practice

Practice sessions are held for fire brigade members on the proper method of fighting various types of fires which might occur in a nuclear power plant. These sessions are scheduled on an annual basis and provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus.

9.5.1.8.1.4 Drills

Fire brigade drills are conducted on a quarterly basis at Callaway Plant. Each fire brigade member shall participate in at least two drills annually. Drills will be of two types: announced and unannounced. At least one unannounced drill will be held annually for each shift fire brigade. Training objectives are established prior to the drill and reviewed by plant management. Afterwards, to determine how well the training objectives have been met the drill is critiqued on the following points:

1. Assessment of fire alarm effectiveness.

2. Assessment of the time required to notify and assemble the fire brigade.

3. Assessment of the selection, placement and use of equipment.

4. Assessment of Fire Brigade Leader's effectiveness in directing the fire fighting effort.

5. Assessment of each Fire Brigade member's knowledge of fire fighting strategy, procedures, and use of equipment, in the area assumed to contain the fire.

6. Assessment of the Fire Brigade's performance as a team.

Fire drills shall be planned and scheduled and implemented to meet the following points:

1. At least one drill shall be performed annually on a back shift for each fire brigade.

2. The drills shall be preplanned to establish the training objectives of the drill and shall be critiqued to determine how well the training objectives have been met.

3. Performance deficiencies of the Fire Brigade or of individual Fire Brigade members shall be remedied by scheduling additional training. Unsatisfactory drill performance shall be followed by a repeat drill within 30 days.

4. Triennially, a randomly selected, unannounced drill shall be critiqued by qualified individuals independent of the Licensee's Staff. A copy of the written report from such individuals shall be available for NRC review.

9.5.1.8.1.5 Meetings

Regular planned meetings shall be held quarterly for Fire Brigade members to review changes in the Fire Protection Program and other subjects as necessary.

9.5.1.9 Fire Fighting Procedures

The development of a complete set of fire fighting procedures is the responsibility of the Manager, Nuclear Engineering. The fire fighting procedures include the following:

1. Actions to be taken by the individual discovering the fire such as notification of the Control Room, attempting to extinguish the fire, and activation of local fire suppression systems.

2. Actions to be taken by the Unit Reactor Operator, such as sounding fire alarms and notifying the Shift Supervisor of the type, size and location of fire.

3. Actions to be taken by the Fire Brigade after notification of a fire, including location to assemble, directions given by the Fire Brigade Leader, the responsibilities of brigade members such as selection of fire fighting and protective equipment, and use of preplanned strategies for fighting fires in specific areas.

4. Actions to be taken by the Security Force after notification of fire.

5. The strategies established for fighting fires in safety-related areas and areas presenting a hazard to safety-related equipment and identification of combustibles in each plant zone covered by a fire fighting procedure.

6. The types of fire extinguishers best suited for controlling fires with the combustible loadings of the zone, and instructions for plant personnel during a fire.

9.5.1.10 Training Records

Individual records of training provided to each Fire Brigade member including drill critiques, shall be maintained for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training shall be available for NRC review.

9.5.1.11 Emergency Lighting

Emergency Lighting Units with at least an eight-hour battery power supply shall be provided in all areas needed for operation of Safe Shutdown Equipment and in access and egress routes thereto.

9.5.1.12 Administrative Controls

Administrative Controls and Procedures are established to ensure the reliable performance of fire protection systems and equipment, and Fire Brigade personnel.

These controls shall establish procedures to:

1. Govern the proper handling of flammable gases and liquids, HEPA and charcoal filters, dry unused ion exchange resins and other combustibles in safety-related areas.

2. Prohibit the storage of combustibles in safety-related areas or establish designated storage areas with appropriate fire protection.

3. Govern the handling of and limit transient fire loads such as flammable liquids, wood and plastic materials in buildings containing safety related systems or equipment. This control requires an inplant review of work activities to identify transient fire loads.

4. Assign the first line supervisor the responsibility for reviewing work activities to identify transient fire loads.

5. Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit shall be issued for each area where work is to be done. If work continues over more than on shift the permit shall be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.

6. Minimize waste, debris, scrap, and oil spills resulting from a work activity in the safety-related area while work is in progress and remove the same upon completion of the activity or at the end of each work shift.

7. Govern periodic inspections for accumulation of combustibles and to ensure continued compliance with these administrative controls.

8. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operations (such as lay-down blocs or scaffolding) shall be treated with a flame retardant. Equipment or supplies shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials shall be removed from the area as soon as practical following the unpacking. Such transient combustible material, unless stored in approved containers, shall not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting shall be placed in metal containers with tight-fitting self-closing metal covers.

9. Control actions to be taken by the individual discovering the fire such as notification of the Control Room, attempting to extinguish the fire, and activation of local fire suppression systems.

10. Control actions to be taken by the Unit Reactor Operator, such as sounding fire alarms, and notifying the Shift Supervisor of the type, size, and location of fire.

11. Control actions to be taken by the Fire Brigade after notification of a fire, including location to assemble, directions given by the fire brigade leader, the responsibilities of brigade members such as selection of fire fighting and protective equipment and use of preplanned strategies for fighting fires in specific areas.

12. Define the strategies established for fighting fires in safety-related areas and areas presenting a hazard to safety-related equipment including the designation of the:

    A. Fire hazards in each plant zone covered by a fire fighting procedure.

    B. Fire extinguishers best suited for controlling fires with the combustible loadings of the zone and the nearest location of these extinguishers.

    C. Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors will be specifically identified in the procedure with the appropriate precautions and methods for access specified.

D. Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical system in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).

E. Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles that need cooling will be designated.

F. Potential radiological and toxic hazards in fire zones.

G. Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operations.

H. Operations requiring Control Room and Operating Supervisor coordination or authorization.

I. Instructions for plant operators and general plant personnel during fire.

13. Organize the Callaway Plant Fire Brigade and assign special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishant to the fire, communication with the control room, and coordination with outside fire departments.

14. Govern the Operability Requirements, Required Actions, and Testing/ Inspection Requirements specified in Section 9.5.1.7 of the Standard Plant FSAR.

9.5.1.13 Fire Barrier Cable Penetration Seal Qualifications

Penetration seal designs shall utilize non-combustible materials and shall be qualified by tests that are comparable to tests used to rate fire barriers. Acceptance Criteria for the test shall include:

1. The Cable Fire Barrier Penetration Seal has withstood the Fire Endurance Test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the Fire Resistance Rating required of the barrier.

2. The Temperature Levels recorded for the unexposed side are analyzed and demonstrate that this maximum temperature is sufficiently below the cable insulation ignition temperature.

3. The Fire Barrier Penetration Seal remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

9.5.1.14 Fire Doors

Fire doors separating safety related areas are provided with closing mechanisms and will be inspected semiannually to verify that the closing mechanisms are operable. Watertight and missile resistant doors are not provided with closing mechanisms.

Fire doors separating safety related areas are normally closed and latched. Fire doors that are locked closed will be inspected weekly to verify position. Fire doors that are closed and latched will be inspected daily to verify that they are in the closed position.

9.5.2 COMMUNICATION SYSTEMS (OFFSITE)

See Section 9.5.2 of the Standard Plant.

9.5.2.1 See Section 9.5.2 of the Standard Plant

9.5.2.2 See Section 9.5.2 of the Standard Plant

9.5.2.2.1 See Section 9.5.2 of the Standard Plant

9.5.2.2.2 See Section 9.5.2 of the Standard Plant

9.5.2.2.3 See Section 9.5.2 of the Standard Plant

9.5.2.2.4 See Section 9.5.2 of the Standard Plant

9.5.2.2.5 See Section 9.5.2 of the Standard Plant

9.5.2.2.6 See Section 9.5.2 of the Standard Plant

9.5.2.2.7 See Section 9.5.2 of the Standard Plant

9.5.2.2.8 See Section 9.5.2 of the Standard Plant

9.5.2.3 See Section 9.5.2 of the Standard Plant

9.5.2.4 See Section 9.5.2 of the Standard Plant

APPENDIX 9.5A - FIRE PROTECTION EVALUATION

APCSB 9.5-1 Appendix A	Union Electric Co.

A. Overall Requirements of Nuclear Plant Fire Protection Program

1. Personnel

Responsibility for the overall fire protection program should be assigned to a designated person in the upper level of management. This person should retain ultimate responsibility even though formulation and assurance of program implementation is delegated. Such delegation of authority should be to staff personnel prepared by training and experience in fire protection and nuclear plant safety to provide a balanced approach in directing the fire protection programs for nuclear power plants. The qualification requirements for the fire protection engineer or consultant who will assist in the design and selection of equipment, inspect and test the completed physical aspects of the system, develop the fire protection program, and assist in the fire-fighting training for the operating plant should be stated. Subsequently, the FSAR should discuss the training and the updating provisions such as fire drills provided for maintaining the competence of the station fire-fighting and operating crew, including personnel responsible for maintaining and inspecting the fire protection equipment.	The Senior Vice President and Chief Nuclear Officer is the upper level management position responsible for the Fire Protection Program. The Manager, Nuclear Engineering is responsible for the overall Fire Protection Program and has the authority to delegate responsibilities and obtain assistance to ensure all fire protection requirements are met. Descriptions of positions receiving delegated responsibilities or providing assistance are described in plant administrative procedures. The site Architect-Engineer's (AE) supervisor of fire protection design assisted in the development, design and equipment specification for the fire protection system. He is a member of the Society of Fire Protection Engineers and a registered professional engineer. Site Addendum Section 9.5 discusses training for maintaining the competence of the station fire fighting and operating crew, including personnel responsible for maintaining and inspecting the fire protection equipment.
The fire protection staff should be responsible for:	

Appendix 9.5A (Sheet 2)

APCSB 9.5-1 Appendix A	Union Electric Co.
(b) design and maintenance of fire detection, suppression, and extinguishing system,	The Manager, Nuclear Engineering is responsible for the overall Fire Protection Program and has the authority to delegate responsibilities and obtain assistance to ensure all fire protection requirements are met. Descriptions of positions receiving delegated responsibilities or providing assistance are described in plant administrative procedures.
(c) fire prevention activities,	
(d) training and manual fire fighting activities of plant personnel and fire brigade.	
(NOTE: NFPA 6 - Recomendations for Organization of Industrial Fire Loss, Prevention, contains useful guidance for organization and operation of the entire fire loss prevision program.	NFPA 6-1974 will be used as a guide for organization and operation of the fire loss prevention program.
4. Single Failure Criterion	
A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire water pumps with independent power supplies and controls should be provided. Postulated fire or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena.	A single failure in the fire suppression system does not impair the primary and backup fire suppression capability. For example, three 50% capacity fire water pumps are provided with independent control.
The effects of lightning strikes should be included in the overall plant fire protection program.	Site facility structures are provided with lightning protection and/or an effective grounding system to minimize the effect of lightning strikes.

Appendix 9.5A (Sheet 3)

APCSB 9.5-1 Appendix A	Union Electric Co.
8. Multiple-Reactor Sites	
On multiple-reactor sites where there are operating reactors and construction of remaining units is being completed, the fire protection program should provide continuing evaluation and include additional fire barriers, fire protection capability, and administrative controls necessary to protect the operating units from construction fire hazards. The superintendent of the operating plant should have the lead responsibility for site fire protection.	Callaway is a single unit Plant.
9. Simultaneous Fires	
Simultaneous fires on more than one reactor need not be postulated, where separation requirements are met. A fire involving more than one reactor unit need not be postulated except for facilities shared between units.	Callaway is a single unit plant.
B. Administrative Procedures, Controls and Fire Brigade	
	Attachments 1 through 5 of the staff supplemental guidance contained in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance" as received in the letter from D.B. Vassello dated August 29, 1977 will be followed.* These commitments are discussed below.

* Referring to Attachment 4, page 1, paragraph 2.0-b of the letter: At Callaway, the hot work fire watch personnel have also received the training qualifying them to perform the survey of the work area. Therefore, either the fire watch personnel, or the responsible foreman or supervisor may do the survey.

Appendix 9.5A (Sheet 4)

APCSB 9.5-1 Appendix A	Union Electric Co.
1. Administrative procedures consistent with the need for maintaining the performance of the fire protection system and personnel in nuclear power plants should be provided.	Section 9.5 describes the administrative procedures for maintaining performance of the fire protection system and personnel in the Callaway Plant. The following publications are used as guides in formulating these procedures.
Guidance is contained in the following publications:	
NFPA 4 - Organization for Fire Services	NFPA 4 - Organization for Fire Services (1971)
NFPA 4A -Organization for Fire Department	NFPA 4A - Organization for Fire Department (1969)
NFPA 6 - Industrial Fire Loss Prevention	NFPA 6 - Industrial Fire Loss Prevention (1974)
NFPA 7 - Management of Fire Emergencies	NFPA 7 - Management of Fire Emergencies (1974)
NFPA 8 - Management Responsibility for Effects of Fire on Operations	NFPA 8 - Management Responsibility for Effects of Fire on Operations (1974)
NFPA 27 -Private Fire Brigades	NFPA 27 - Private Fire Brigades (1975)
2. Effective administrative measures should be implemented to prohibit bulk storage of combustible material inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants", provides guidance on housekeeping, including the disposal of combustible materials.	Site Addendum Section 9.5 describes administrative procedures to control the storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39 and Appendix R to 10CFR50 will be utilized to develop these procedures.

Appendix 9.5A (Sheet 5)

APCSB 9.5-1 Appendix A	Union Electric Co.
3. Normal and abnormal conditions or other anticipated operations such as modifications (e.g., breaking fire stops, impairment of fire detection and suppression system) and refueling activities should be reviewed by appropriate levels of management and appropriate special actions and procedures such as fire watches or temporary fire barriers implemented to assure adequate fire protection and reactor safety. In particular:	Site Addendum Section 9.5 describes the methods by which appropriate levels of management will review normal and abnormal conditions or other anticipated operations which require special actions or procedures to assure adequate fire protection and reactor safety.
(a) Work involving ignition sources such as welding and flame cutting should be done under closely controlled conditions. Procedures governing such work should be reviewed and approved by persons trained and experienced in fire protection. Persons performing and directly assisting in such work should be trained and equipped to prevent and combat fires. If this is not possible, a person qualified in fire protection should directly monitor the work and function as a fire watch.	(a) Site Addendum Section 9.5 describes procedure by which work involving ignition sources is reviewed by plant staff personnel trained and experienced in fire protection. All personnel performing such work have received training and have equipment available for combating fires. If this is not possible, a person having received training in fire protection will function as a fire watch.
(b) Leak testing, and similar procedures such as air flow determination, should use one of the commercially available aerosol techniques. Open flames or combustion generated smoke should not be permitted.	(b) Leak testing and air flow determinations use commercially available aerosol techniques. Open flames or combustion generated smoke are not used.

Appendix 9.5A (Sheet 6)

APCSB 9.5-1 Appendix A	Union Electric Co.
(c) Use of combustible material, e.g., HEPA and charcoal filters, dry ion exchange resins or other combustible supplies in safety-related areas should be controlled. Use of wood inside buildings containing safety-related systems or equipment should be permitted only when suitable non-combustible substitutes are not available. If wood must be used, only fire retardant treated wood (scaffolding, lay down blocks) should be permitted. Such materials should be allowed into safety related areas only when they are to be used immediately. Their possible and probable use should be considered in the fire hazard analysis to determine the adequacy of the installed fire protection systems.	(c) Use of combustible materials in safety-related areas is controlled. Combustible materials are used only when suitable non-combustible materials are not available. If wood is used, it is treated with a fire retardant. Standpipes with hose stations or portable fire extinguishers are located to provide coverage of safety-related areas.
4. Nuclear power plants are frequently located in remote areas, at some distance from public fire departments. Also, first response fire departments are often volunteer. Public fire department response should be considered in the overall fire protection program. However, the plant should be designed to be self-sufficient with respect to fire fighting activities and rely on the public response only for supplemental or backup capability.	The Callaway Plant is designed to be self-sufficient with respect to fire fighting activities.

Appendix 9.5A (Sheet 7)

APCSB 9.5-1 Appendix A	Union Electric Co.
5. The need for good organizations, training and equipping of fire brigades at nuclear power plant sites requires effective measures be implemented to assure proper discharge of these functions. The guidance in Regulatory Guide 1.101 "Emergency Planning for Nuclear Power Plants", should be followed as applicable.	Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants" is used in organizing, training and equipping the plant fire brigade.
(a) Successful fire fighting requires testing and maintenance of the fire protection equipment, emergency lighting and communication, as well as practice brigades for the people who must utilize the equipment. A test plant that lists the individuals and their responsibilities in connection with routine tests and inspections of the fire detection and protection systems should be developed. The test plan should contain the types, frequency and detailed procedures for testing. Procedures should also contain instructions for maintaining fire protection system is impaired or during periods of plant maintenance, e.g., fire watches or temporary hose connections to water systems.	(a) The plan is described in Site Addendum Section 9.5 for testing and maintenance of the fire protection equipment. The plan includes definitions of routine tests and inspections of the fire detection and protection systems, the individuals responsible and the frequency with which tests and inspections are to be carried out. Procedures also contain instructions on maintaining fire protection during those periods when the fire protection system is impaired or during periods of plant maintenance.

Appendix 9.5A (Sheet 8)

APCSB 9.5-1 Appendix A	Union Electric Co.
(b) Basic training is a necessary element in effective fire fighting operation. In order for a fire brigade to operate effectively, it must operate as a team. All members must know what their individual duties are. They must be familiar with the layout of the plant and equipment location and operation in order to permit effective fire-fighting operations during times when a particular area is filled with smoke or is insufficiently lighted. Such training can only be accomplished by conducting drills several times a year (at least quarterly) so that all members of the fire brigade have had the opportunity to train as a team, testing itself in the major areas of the plant. The drills should include the simulated use of equipment in each area and should be pre-planned and post-critiqued to establish the training objective of the drills and determine how well these objectives have been met. These drills should periodically (at least annually) include local fire department where possible. Such drills also permit supervising personnel to evaluate the effectiveness of communications within the fire brigade and with the on scene fire team leader, the reactor operator in the control room, and the offsite command post.	(b) Procedures are described in Site Addendum Section 9.5 for the training of fire-fighting teams. Training includes preplanned and post-critiqued quarterly drills to determine the effectiveness of the fire-fighting operation. Callaway Plant is designed to be self-sufficient with respect to fire fighting activities, therefore drills will not include local fire department participation.

Appendix 9.5A (Sheet 9)

APCSB 9.5-1 Appendix A	Union Electric Co.
(c) To have proper coverage during all phases of operation, members of each shift crew should be trained in fire protection. Training of the plant fire brigade should be coordinated with the local fire department so that responsibilities and duties are delineated in advance. This coordination should be part of the training of the local fire department staff. Local fire departments should be educated in the operational precautions when fighting fire on nuclear power plant sites. Local fire departments should be made aware of the need for radioactive protection of personnel and the special hazards associated with a nuclear power plant site.	(c) Fire Brigade members of each shift crew are trained in fire protection. Callaway Plant is designed to be self-sufficient with respect to fire fighting activities, therefore fire brigade training will not be coordinated with local fire departments, nor will local fire departments be educated in the operational precautions when fighting fires on nuclear power plant sites.

Appendix 9.5A (Sheet 10)

APCSB 9.5-1 Appendix A	Union Electric Co.
(d) NFPA 27, "Private Fire Brigade" should be followed in organization, training, and fire drills. This standard also is applicable for the inspection and maintenance of fire fighting equipment. Among the standards referenced in this document, the following should be utilized: NFPA 194, "Standard for Screw Threads and Gaskets for Fire Hose Couplings", NFPA 196, "Standard for Fire Hose," NFPA 197, "Training Standard on Initial Fire Attacks," NFPA 601, "Recommended Manual of Instructions and Duties for the Plant Watchman on Guard," NFPA booklets and pamphlets listed on page 27-11 of Volume 8, 1971-71 are also applicable for good training references. In addition, courses in fire prevention and fire suppression which are recognized and/or sponsored by the fire protection industry should be utilized.	(d) The following standards are used as guides in organization, training, carrying out fire drills, inspection and maintenance of fire fighting equipment: NFPA 27 - Private Fire Brigades (1975) NFPA 194 - Standard for Screw Threads and Gaskets for Fire House Couplings (1974) NFPA 196 - Standard for Fire Hose (1976) NFPA 197 - Training Standard on Initial Attacks (1966) Other guides and training courses will be utilized as deemed necessary.

Appendix 9.5A (Sheet 11)

APCSB 9.5-1 Appendix A	Union Electric Co.
C. Quality Assurance Program Quality assurance (QA) programs of applicants and contractors should be developed and implemented to assure that the requirements for design procurement, installation, and testing and administrative controls for the fire protection program for safety-related areas as defined in this Branch Position are satisfied. The program should be under the management control of the QA organization. The QA program criteria that apply to the fire protection program should include the following:	The Fire Protection QA program is a graded QA program under the management of the Union Electric QA organization. The Fire Protection QA Program is applied to the portions of the Fire Protection Program which protect safety-related areas. Initiation of the original design phase and original equipment procurement commenced before issuance of the NRC letter and attachment 6 on August 29, 1977, signed by D. B. Vassallo and were not performed under the guidance of criteria 1 and 3 and had proceeded to a point where modifying ongoing design and procurement to conform to the scope outlined in Appendix A was not feasible. The activities related to these two criteria were performed under standard engineering and procurement methods, that were considered acceptable by Union Electric. Additionally, the design was reviewed by Union Electric's engineering staff and by American Nuclear Insurers (ANI). The March 20, 1980 NRC letter questioned this alternate method of complying with Criteria and 3 and Union Electric has revised its position accordingly.

Appendix 9.5A (Sheet 12)

APCSB 9.5-1 Appendix A	Union Electric Co.
	For design documents and procurement related documents that were prepared during the interim period subsequent to the Branch Technical Position and prior to June 1, 1980, an independent review, by knowledgeable personnel, will be performed. Verification of fire protection system design and component material performance and integrity is accomplished where applicable, by preoperational and startup testing. These tests are performed and documented in accordance with written and approved test procedures and are subject to the Quality Assurance Program as outlined below. This program is based on applicable sections of the OQAM. Each section either endorses or is derived from its respective OQAM section. Training of personnel who maintain, inspect and test the fire protection system is as described in the OQAM, Section 2.0. The existing line organizations described in Section 1.0 of the OQAM are responsible for compliance with this program. No separate organization is required to implement the requirements.
1. Design Control and Procurement Document Control	Design controls for fire protection are as described in OQAM, Section 3.0

Appendix 9.5A (Sheet 13)

APCSB 9.5-1 Appendix A	Union Electric Co.
Measures should be established to assure that all design-related guidelines of the Branch Technical Position are included in design and procurement documents and that deviations therefore are controlled.	Procurement document controls shall be established to assure procurement documents adequately state the quality and technical requirements. Special scope requirements are specified in the procurement documents as appropriate (e.g. receipt inspection criteria, qualification testing requirements) and plant procedures. Measures to control the issuance of documents are as described in the OQAM, Section 6.0.
2. Instructions, Procedures and Drawings	
Inspections, tests, administrative controls, fire drills and training that govern the fire protection program should be prescribed by documented instructions, procedures or drawings and should be accomplished in accordance with these documents.	Measures for instructions, procedures, and drawings are as described in the OQAM, Section 5.0 Fire protection administrative control procedures, instructions, and drawings related to design, modification, installation, inspection, test, and maintenance are reviewed to assure appropriate fire protection requirements are included such as: precautions; control of ignition sources and combustibles; and provisions for backup fire protection, if the activities require disabling a fire protection system. The installation or application of penetration seals and fire retardant coatings are performed in accordance with plant procedures or manufacturer's instructions by personnel knowledgeable of these instructions.
3. Control of Purchased Material, Equipment, and Services	

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APCSB 9.5-1 Appendix A	Union Electric Co.
Measures should be established to assure that purchased material, equipment and services conform to the procurement documents.	Purchased material, equipment and services shall conform to procurement documents as prescribed in OQAM Section 4.0. In addition, the following controls are implemented: a) Suppliers of fire protection materials and equipment are from vendors commercially qualified to provide the material and equipment. b) Inspection or performance testing is conducted to verify that material, equipment, and services pertaining to the fire protection system conform to procurement documents. Inspections shall occur as receipt inspections, or installation inspections, or both as appropriate.
4. Inspection	
A program for independent inspection of activities affecting fire protection should be established and executed by, or for, the organization performing the activity to verify conformance with documented installation drawings and test procedures for accomplishing the activities.	Maintenance or modifications to the Fire Protection System (FPS), including emergency lighting, are subject to inspection to assure conformation to design and installation requirements. Such inspections may occur as receipt inspections or installation inspections, or both, as appropriate. The installation of the portions of the fire protection system where performance cannot be verified through preoperational tests, such as penetrations seals, fire retardant coatings, cable routing, and fire barriers shall be inspected.

Appendix 9.5A (Sheet 15)

APCSB 9.5-1 Appendix A	Union Electric Co.
	Inspections are performed by individuals who are knowledgeable of fire protection design and installation requirements. These inspections are performed in accordance with procedures or checklists and shall include, as applicable, the following: a) Identification of items/activities to be inspected. b) Individuals/organizations responsible to perform inspections. c) Referenced design documents and acceptance criteria. d) Identification of inspection method. e) Documentation requirements. f) Inspection results, inspection signoff. FSAR-SA, Section 9.5.1.4 describes the program by which the elements of the fire protection system are inspected to assure they are in acceptable condition. for those materials subject to degradation (such as fire stops, seals and fire retardant coatings) periodic visual inspections are performed to assure they have not deteriorated or been damaged. Periodic inspections and/or tests are performed of fire protection systems, emergency breathing and auxiliary equipment, and emergency lighting equipment to assure acceptable condition of these items. Such inspections and/or tests are performed during the operating phase of the plant.

Appendix 9.5A (Sheet 16)

APCSB 9.5-1 Appendix A	Union Electric Co.
5. Test and Test Control	
A test program should be established and implemented to assure that testing is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. The test should be performed in accordance with written tests procedures; test results should be properly evaluated and acted on.	FSAR-SA Section 9.5.1.4 describes the program by which preoperational testing shall be performed to verify conformance with design and system performance. Written test procedures for preoperational tests shall incorporate the requirements and acceptance limits contained in applicable design documents. System tests are supplemented, where appropriate by prototype commercial performance testing specified in procurement documents and performed in accordance with applicable industry standards. The OQAM, Section 11.0 describes the program to verify conformance with design following modification, repair or replacement of portions of the FPS. Also discussed is a program of periodic tests to verify system readiness requirements.
6. Inspection, Test and Operating Status	
Measures should be established to provide for the identification of items that have satisfactorily passed required tests and inspections.	Measures shall exist to identify items that have satisfactorily passed required preoperational tests and inspections. Identification shall consist of tags, labels or other means of control.
7. Non-Conforming Items	
Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use of (or) installation.	Items that do not conform to specific requirements are identified during inspection and/or tests. Controls for nonconforming material and equipment are as described in the OQAM, section 15.0.

APCSB 9.5-1 Appendix A	Union Electric Co.
8. Corrective Action	
Measures should be established to assure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and nonconformances are promptly identified, reported and corrected.	Failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and nonconformances which affect fire protection are controlled as discussed in the OQAM, Section 16.0.
9. Records	
Records should be prepared and maintained to furnish evidence that the criteria enumerated above are being met for activities affecting the fire protection program.	Records are maintained to show the applicable supplemental QA program criteria commitments are being satisfied for activities affecting the Fire Protection Program in accordance with the OQAM, Section 17.0.
10. Audits	
Audits should be conducted and documented to verify compliance with the fire protection program including design and procurement documents; instruction, procedures and drawings; and inspection and test activities.	Audits of the Fire Protection Program are performed as required by the OQAM, Section 18.0. Audits are conducted in accordance with NRC Generic Letter 82-21.
D. General Guidelines for Plant Protection	
2. Control of Combustibles	
(b) Bulk gas storage (either compressed or cryogenic), should not be permitted inside structures housing safety-related equipment. Storage of flammable gas such as hydrogen, should be located outdoors or in separate detached buildings so that a fire or explosion will not adversely affect any safety-related systems or equipment.	(b) Flammable bulk gas stored on site is located outside and remote from safety-related structures so that a fire or explosion will not affect safety-related systems or equipment. Use of compressed gases inside buildings is controlled.

Appendix 9.5A (Sheet 18)

APCSB 9.5-1 Appendix A	Union Electric Co.
(Refer to NFPA 50A, "Gaseous Hydrogen Systems.")	
Care should be taken to locate high pressure gas storage containers with the long axis parallel to building walls. This will minimize the possibility of wall penetration in the event of a container failure. Use of compressed gases (especially flammable and fuel gases) inside buildings should be controlled. (Refer to NFPA 6, "Industrial Fire Loss Prevention.")	High pressure gas containers have their long axis parallel to building walls.
(c) The use of plastic materials should be minimized. In particular, halogenated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute non-combustible materials are not available. All plastic materials, including flame and fire retardent materials, will burn with an intensity and BTU production in a range similar to that of ordinary hydrocarbons. When burning, they produce heavy smoke that obscures visibility and can plug air filters, especially charcoal and HEPA. The halogenated plastics also release free chlorine when burning which is toxic to humans and corrosive to equipment.	(c) The use of plastic materials in construction of site-related buildings and facilities is minimized.
(d) Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, "Flammable and Combustible Liquids Code".	(d) The storage of flammable liquids complies, as a minimum with the requirements of NFPA 30-1973, "Flammable and Combustible Liquids Code" and is administratively controlled.

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APCSB 9.5-1 Appendix A	Union Electric Co.
4. Ventilation	
(h) Self-contained breathing apparatus, using full-face positive-pressure masks, approved by NIOSH (National Institute for Occupational Safety and Health - approval formerly given by the U.S. Bureau of Mines) should be provided for fire brigade, damage control, and control room personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or operating life should be a minimum of one half hour for the self-contained units. At least two extra air bottles should be located onsite for each self-contained breathing unit. In addition, an onsite 6-hour supply of reserve air should be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air should be used. Special care must be taken to locate the compressor in areas free of dust and contaminants.	(h) Self-contained breathing apparatus, approved by NIOSH are provided for selected fire brigade and emergency repair personnel. Two extra air bottles are provided for each self-contained breathing unit. An additional onsite 6-hour supply of reserve air is provided to permit quick and complete replenishment of exhausted supply air bottles.
5. Lighting and Communication	
(b) Suitable sealed-beam battery-powered portable hand lights should be provided for emergency use.	(b) Suitable sealed-beam battery-powered portable hand lights are provided for emergency use.

Appendix 9.5A (Sheet 20)

APCSB 9.5-1 Appendix A	Union Electric Co.
(d) Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.	(d) The plant radio communication system makes use of the Corporate Communication Transport System and fixed repeaters. This equipment is located in a locked area to provide administrative control to personnel having access to this equipment. Fire detection and extinguishing equipment are provided in the event of a fire. Fixed plant communications system provide a backup to the plant radio communication system. Refer to Section 13.6 for a discussion of security radio communications.

APCSB 9.5-1 Appendix A	Union Electric Co.
E. Fire Detection and Suppression	
2. Fire Protection Water Supply Systems	
(a) An underground yard fire main loop should be installed to furnish anticipated fire water requirements. NFPA 24 - Standard for Outside Protection - gives necessary guidance for such installation. It references other design codes and standards developed by such organizations as the American National Standards Institute (ANSI) and the American Water Works Association (AWWA). Lined steel or cast iron pipe should be used to reduce internal tuberculation. Such tuberculation deposits in an unlined pipe over a period of years can significantly reduce water flow through the combination of increased friction and reduced pipe diameter. Means for treating and flushing the systems should be provided. Approved visually indicating sectional control valves, such as Post Indicator Valves, should be provided to isolate portions of the main for maintenance or repair without shutting off the entire system.	(a) An underground yard fire main loop is installed to furnish anticipated fire water requirements. NFPA 24(1973) is used as a guide in the design and installation of the fire main loop. Unlined steel pipe is used in the fire mains. However, the pipe is oversized to allow for internal tuberculation caused by deposits over the period of years that the pipe will be in service. The internal deposits, if any, will not limit the water flow required. Primary treatment of the fire protection water consists of clarifying in the Water Treatment Plant or the water is supplied from a deep well without treatment. Means to flush the system are provided. Post indicator valves are provided to isolate portions of the main for maintenance or repair without shutting off the entire system.
The fire main system piping should be separate from service or sanitary water system piping.	The fire protection system piping is not interconnected with any sanitary or service water systems.

Appendix 9.5A (Sheet 22)

APCSB 9.5-1 Appendix A	Union Electric Co.
(b) A common yard fire main loop may serve multi-unit nuclear power plant sites, if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized. The water supply should be sized for the largest single expected flow. For multiple reactor sites with widely separated plant (approaching 1 mile or more), separate yard fire main loops should be used.	(b) Callaway is a single unit plant
For Plants Under Construction:	
Sectionalized systems are acceptable.	

Appendix 9.5A (Sheet 23)

APCSB 9.5-1 Appendix A	Union Electric Co.
(c) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided so that 100% capacity will be available with one pump inactive (e.g., three 50% pumps or two 100% pumps). The connection to the yard fire main loop from each fire pump should be widely separated, preferably located on opposite sides of the plant. Each pump should have its own driver with independent power supplies and control. At least one pump (if not powered from the emergency diesels) should be driven by non-electrical means, preferable diesel engine. Pumps and drivers should be located in rooms separated from the remaining pumps and equipment by a minimum three-hour fire wall. Alarms indicating pump running, driver availability, or failure to start should be provided in the control room. Details of the fire pump installation should as a minimum conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps.	(c) Three 50% capacity pumps are provided so that one inactive pump does not curtail the ability of the system to supply 100% capacity flow. Connection to the yard fire main loop is through two supply lines from opposite sides of the fire pump house. each pump has its own driver. One pump is motor-driven and two are diesel-driven. The pumps are provided with independent controls. Fire pumps and controls are Underwriter's Laboratory and Factory Mutual rated. Controllers and pumps will be installed and tested in accordance with NFPA 20-1974, except that the frequency of periodic fire pump testing will be as required by Table 9.5.1-2 of the standard plant FSAR. The fire protection system pumps are located in a separate building. Alarms providing indication of pump running driver availability or failure to start are provided in the main control room. The fire pump installation meets, as a minimum, NFPA 20-1974, "Standards for the Centrifugal Fire Pumps." There is no fire detection system provided in the fire pumphouse. Plant operators would be made aware of a fire in the pumphouse by an annunciator in the main control room, which is actuated by a flow switch in the sprinkler system.

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	Fire suppression in the fire pumphouse consists of an automatic wet pipe sprinkler system located in all zones containing fixed combustibles. Yard hydrants, fire hose stations, and portable fire extinguishers also provide protection for the fire pumphouse.
(d) Two separate reliable water supplies should be provided. If tanks are used, two 100% (minimum of 300,000 gallons each) system capacity tanks should be installed. They should be so interconnected that pumps can take suction from either or both. However, a leak in one tank or its piping should not cause both tanks to drain. The main plant fire water supply capacity should be capable of refilling either tank in a minimum of eight hours. Common tanks are permitted for fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by means of a vertical stand pipe for other water services.	(d) Two separate 300,000 gallon capacity tanks are furnished. The tanks are interconnected so that pumps can take suction from either/ or both of the tanks. Check valves are provided so that a leak in one tank or its supply piping does not cause both tanks to drain. The main plant fire water supply system from the Water Treating Plant has sufficient capacity to refill one tank in a minimum of eight hours. The fire protection system water storage is not interconnected with any sanitary or service water storage systems.
(e) The fire water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 1,000 gpm for manual hose streams plus the greater of:	(e) The fire protection system (total capacity and flow rate) water supply is based on the maximum expected flow rate for two hours. The design flow rate is based on 2300 gpm to sprinklers in the largest designed fire area plus 1000 gpm for manual hose streams.

Appendix 9.5A (Sheet 25)

APCSB 9.5-1 Appendix A	Union Electric Co.
(1) all sprinkler heads opened and flowing in the largest designed fire area; or	
(2) the largest open head deluge system(s) operating.	
(f) Lakes of fresh water ponds of sufficient size may qualify as sole source of water for fire protection, but require at least two intakes to the pump supply. When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied:	(f) Lakes or fresh water ponds are not used for fire protection water supply nor is the supply common with any other water supply.
(1) The additional fire protection water requirements are designed into the total storage capacity; and	
(2) Failure of the fire protection system should not degrade the function of the ultimate heat sink.	
(g) Outside manual hose installation should be sufficient to reach any location with an effective hose stream. To accomplish this hydrants should be installed approximately every 250 feet on the yard main system. The lateral to each hydrant from the yard main should be controlled by a visually indicating or key operated (curb) valve. A hose house, equipped with hose and combination nozzle, and other auxiliary equipment recommended in NFPA 24, "Outside Protection", should be provided as needed but at least every 1,000 feet.	(g) Hydrants are installed approximately every 250 feet on the yard main system. Fire fighting equipment is supplied by two mobile units, each equipped to meet the requirements of the American Nuclear Insurers (ANI) which are similar to NFPA 24-1973. The lateral to each hydrant is furnished with a curb valve. Post indicator valves are provided in the yard main system to provide for isolation of damaged hydrants without significantly reducing the effectiveness of the supply system.

APCSB 9.5-1 Appendix A	Union Electric Co.
Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings and standpipe risers.	Callaway Plant is designed to be self-sufficient with respect to fire fighting activities, however, hose threads are compatible with those typically used by local fire departments, by means of adaptors as required.
3. Water Sprinklers and Hose Standpipe Systems	
(b) All valves in the fire water systems should be electrically supervised. The electrical supervision signal should indicate in the control room and other appropriate command locations in the plant (See NFPA 26, "Supervision of Valves.")	(b) Isolation valves for each fixed extinguishing system and each main fire protection system header are electrically supervised with indication to the control room. All other isolation and sectional control valves are locked with breakaway locks in the appropriate position and visually inspected monthly.
F. Guidelines for Specific Plant Areas	
1. Primary and Secondary Containment	
(b) Refueling and Maintenance operations in containment may introduce additional hazards such as contamination control materials, decontamination supplies, wood planking, temporary wiring, welding and flame cutting (with portable compressed fuel gas supply). Possible fire would not necessarily be in the vicinity of fixed detection and suppression systems. Management procedures and controls necessary to assure adequate fire protection are discussed in Section 3a.	(b) Section B.3, Administrative Procedures, Controls and Fire Brigade, discusses normal and abnormal conditions or other anticipated operations which require special actions or procedures to assure adequate fire protection and reactor safety.

Appendix 9.5A (Sheet 27)

APCSB 9.5-1 Appendix A	Union Electric Co.
16. Safety-Related Water Tanks	
Storage tanks that supply water for safe shutdown should be protected from the effects of fire. Hose stations and portable extinguishers should be provided. Portable extinguishers should be located in nearby hose houses. Combustible materials should not be stored next to outdoor tanks. A minimum of 50 feet of separation should be provided between outdoor tanks and combustible materials where feasible.	Storage tanks that supply water for safe shutdown are constructed of noncombustible or fire resistant materials and are not located within 50 feet of any other combustible structures or stored materials. Nearby fire hydrants are provided. Fire fighting equipment is supplied by two mobile units. Portable extinguishers are not provided in the hose houses because the lack of combustible materials obviates their need.
17. Cooling Tower	
The cooling tower should be of noncombustible construction or so located that a fire will not adversely affect any safety-related systems or equipment. Cooling towers should be of noncombustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply.	The circulating water cooling tower is located such that a fire at that location will not adversely affect safety-related systems or equipment. The tower is of non-combustible construction and the basins are not used for the ultimate heat sink nor the fire protection water supply. However, a Siamese connection is located on a lateral of the main fire loop near the circulating water cooling tower to permit pumping from the cooling tower basin into the fire main. The safety-related cooling tower structures associated with the ultimate heat sink are constructed of non-combustible materials, with the exception of the cooling tower fan blades and cylinders, which have a flame spread rating of 35. Refer to fire hazards analysis, Appendix 9.5B.
18. Miscellaneous Areas	

Appendix 9.5A (Sheet 28)

APCSB 9.5-1 Appendix A	Union Electric Co.
Miscellaneous areas such as records storage areas, shops, warehouses, and auxiliary boiler rooms should be so located that a fire or effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment. Fuel oil tanks for auxiliary boilers should be buried or provided with dikes to contain the entire tank contents.	Record storage areas, shops, warehouses and other auxiliary equipment for the site related facilities are so located that a fire or the effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment. Fuel oil tank for the auxiliary boiler is provided with a dike to contain the entire tank contents.

G. Special Protection Guidelines

1. Welding and Cutting, Acetylene-Oxygen Fuel Gas Systems

This equipment is used in various areas throughout the plant. Storage locations should be chosen to permit fire protection by automatic sprinkler systems. Local hose stations and portable equipment should be provided as backup. The requirements of NFPA 51 and 51B are applicable to these hazards. A permit system should be required to utilize this equipment. (Also refer to 2f herein.)	Use and storage of welding and cutting, acetylene-oxygen fuel gas systems will be in accordance with NFPA 51-1974 and NFPA 51B-1971. Use of these materials will be under strict administrative control.

APPENDIX 9.5B - FIRE HAZARDS ANALYSIS FOR SITE FACILITIES OUTSIDE THE STANDARD POWER BLOCK

This Fire Hazards Analysis was performed, as required by Appendix R of 10 CFR 50, to identify potential fire hazards which could damage equipment required for safe shutdown, to evaluate the protection provided for each hazard, and to confirm that safe shutdown will not be prevented by a fire. Procedures used in performing the analysis, the assumptions, and the clarifications are described in the Standard Plant FSAR Appendix 9.5B. The relative locations of fire areas described are shown on Figure 9.5-1.

Fire Area Description	Major Equipment
Essential Service Water (ESW) Pump House Rooms U104 and U105	ESW Pumps, Strainers, Pre-Lube Storage Tanks,

Design Features

The ESW pump house rooms are separated by 3-hour-rated fire barriers. Refer to Figure 3.8-1. Each of the two redundant pumps are located in a separate pump room. The two pump rooms and intake bays are separated by 3-hour-rated fire barriers.

Combustible Loading

Rooms	Combustible Loading Classification
U104	Low
U105	Low

Fire Protection

An automatic detection system is installed in this area. The system alarms locally and in the control room. Hose stations and portable extinguishers are available to manually extinguish any fire in the pump house area.

Isolation and Smoke Removal

A fire in either of these rooms will be contained to the room of origin by the intervening fire barriers. Portable fans and flexible ducting can be used to remove smoke from the area.

Safe Shutdown Equipment

Refer to FSAR (SP) Table 9.5B-2 for a complete listing of all electrically powered safe shutdown components located in the room(s) of this fire area (NOTE ROOM U104 AND U105 IN FIRE ZONES UNPH AND USPH). ONLY ESW EQUIPMENT IS LOCATED IN THESE ROOMS.

Analysis

Fire Suppression

A fire in this area will be detected by the automatic detection system. Fire barriers between the pump rooms prevent a single fire from damaging redundant ESW trains. Manual fire suppression equipment is available to extinguish a fire in this Area.

Safe Shutdown Capability

Only one separation group of raceways and equipment is located in each room. Those circuits and equipment redundant to each other are separated by qualified 3-hour-rated fire barriers. Therefore, fire damage to either room will not prevent safe shutdown.

Fire Area Description	Major Equipment
Ultimate Heat Sink (UHS) Cooling Towers	Cooling Towers and Fans

Design Features

All redundant cooling tower cells are separated by 3-hour-rated fire barriers.

Combustible Loading

Rooms	Combustible Loading Classification
North Cells and South Cells	Moderate

Fire Protection

Yard hydrants are located near the cooling towers for manual fire fighting. Fire fighting equipment is supplied by two mobile units.

Refer to FSAR (SP) Table 9.5B-2 for a complete listing of all electrically powered safe shutdown components located in the room(s) of this fire area (NOTE ROOMS U301, U302, U306 AND U304, U305, U307 IN FIRE ZONES UNCT AND USCT). ONLY UHS EQUIPMENT IS LOCATED IN THESE ROOMS.

Analysis

Fire Suppression

Fire barriers between redundant cells and fan electrical equipment rooms prevent a single fire from damaging redundant trains. Manual fire suppression equipment is available to extinguish a fire in this area.

Safe Shutdown Capability

Since redundant cooling tower cells and associated circuits and equipment are separated by 3-hour-rated fire barriers, a fire in this area will not prevent a safe plant shutdown.

Fire Area Description	Major Equipment
Yard Areas Around Refueling Water Storage Tank and Condensate Storage Tank	Refueling Water Storage Tank Condensate Storage Tank, Demineralized Water Tank, Reactor Makeup Water Tank
Emergency Diesel Fuel Oil Storage Tanks	Emergency Diesel Fuel Oil Storage Tanks

Design Features

The water storage tanks serving the power block are located in yard areas containing negligible quantities of combustibles, with the exception of the condensate storage tank and refueling water storage tank which have urethane foam insulation on the top exterior surface. None of these tanks are used as a source of fire water.

The emergency diesel fuel oil storage tanks are buried beneath 12 feet of compacted backfill. The redundant tanks are separated horizontally by 6 feet of compacted backfill.

Combustible Loading

Fixed Combustibles

Area	Combustible Material	Fire Load Btu/ft^2
East of Reactor Bldg.(CST)	Urethane foam insulation (278 ft^3)	3399

Area	Combustible Material	Fire Load Btu/ft^2
East of Fuel Bldg. (RWST)	Urethane foam insulation	7393
West of Fuel Bldg.	Diesel fuel oil (200,000 gal)	NA

Fire Protection

Yard hydrants are located throughout the power block area to provide fire protection for these areas. Fire fighting equipment is supplied by two mobile units.

Safe Shutdown Equipment

The refueling water storage tank and emergency diesel fuel oil storage tanks are the only tanks in this area that are safety related. The condensate storage tank is not considered safety related but is used to supply auxiliary feedwater to bring the plant to safe shutdown. The ultimate heat sink provides a back-up source of auxiliary feedwater. The other water storage tanks (demineralized water and reactor makeup water) are not needed for safe shutdown.

Analysis

Fire Suppression

Manual fire suppression equipment is available to extinguish a fire in this area.

Safe Shutdown Capability

Since the only fixed combustible material located in these areas (diesel fuel oil) is buried beneath 12 feet of backfill, a fire is not postulated within the area. The exposure hazard from a fire in a power block building to the storage tanks is negligible. The fire loading in those adjacent buildings with external metal siding walls (auxiliary boiler and hot machine shop) is light. All other buildings are separated from the tank area by concrete exterior walls. Therefore, an exposure fire in this area will not prevent safe shutdown of the plant.

Redundant level transmitters for the refueling water storage tank are located in the RWST valve house. These transmitters are required for safe shutdown only to maintain the pressure boundary of the RWST. Since these transmitters perform no active function

in a fire/safe shutdown scene and a fire will not prevent the safe shutdown of the plant. Local level indication is provided at the RWST.

Fire Area Description	Major Equipment
Yard Areas Outside Power Block	Switchyard Oil-filled Transformers, Oxygen Storage Tanks, Hydrogen Storage Tanks, Fuel Oil Storage Tank

Fire Protection

An underground yard main provides fire fighting water to the buildings in the plant area as well as to the switchyard and fuel oil storage tank area. Fire hydrants are located at approximately 250-foot intervals along the yard main with manual fire fighting equipment supplied by two mobile units.

Switchyard oil-filled transformers are located more than 500 feet from any safe shutdown equipment or building containing safe shutdown equipment.

The above ground fuel oil storage tank holds 300,000 gallons of No. 2 fuel oil and is located 300 feet from the nearest safe shutdown equipment (Unit 1 UHS cooling towers). The oil storage tank is surrounded by a dike sized to contain the entire contents of the tank.

Hydrogen is stored outdoors, approximately 350 feet from the safety-related structure (fuel building). Storage is in accordance with OSHA Standard 1910.103 and NFPA-50A, 1973.

Oxygen is stored outdoors, approximately 310 feet from the nearest safe shutdown equipment (refueling water storage tank) with the radwaste building located between the oxygen and the RWST. Storage is in accordance with OSHA Standard 1910.104 and NFPA-50, 1974.

No other structure or equipment outside the power block is safety related or a fire hazard to safe shutdown buildings or equipment.

Analysis

Rupture of the fuel oil storage tank will be contained by the dike around the tank. A fire in this tank or in the dike will not present a significant exposure hazard to the UHS cooling tower or any other safe shutdown equipment because of its remote location.

The fire barriers, physical separation, and manual suppression equipment described above assures that a fire in any of these areas will not prevent a safe shutdown of the plant.

APPENDIX 9.5C - RESPONSES TO QUESTIONS CONTAINED IN THE NRC'S LETTER DATED APRIL 14, 1978 FROM OLAN D. PARR TO UNION ELECTRIC COMPANY THESE RESPONSES WERE PREVIOUSLY TRANSMITTED BY ULNRC-271, DATED JULY 5, 1978.

(Note that all section and page numbers referenced by the NRC in the questions contained in this appendix are those contained in the original Site Related Fire Protection Report dated April 15, 1977.)

Appendix 9.5C (Sheet 2)

Item 1 Section 9.5.1.2, Page 9.5-2

Neither your general description nor the fire hazards analysis includes information concerning fire detection, fire suppression, and fire rated construction in the fire pump area. Revise your fire protection evaluation accordingly.

Response

Refer to Section Appendix 9.5-A.E.2.(C)

Item 2 Section 9.5.1.2, Page 9.5-2

NFPA 24 requires outside hose stations to be equipped with 2 1/2 inch hose. Confirm that 2 1/2 inch hose will be provided instead of 1 1/2 inch hose as stated.

Response

The 1977 Edition of NFPA does not require 2 1/2 inch hose be provided for outside hose stations. Both 1 1/2" and 2 1/2" hose will be provided for outside hose stations.

Item 3 Section 9.5.1.3, Page 9.5-3

Confirm that the fire pumps and controllers are Underwriter's Laboratory or Factory Mutual rated and are installed and tested according to NFPA Standard 20.

Response

Refer to Section Appendix 9.5-A.E.2.(C)

Item 4 Table 9.5-2, Sheet 2

Confirm that the fire barriers and penetration seals in the fire barriers for the essential service water pumphouse will be fire rated for three hours.

Response

Refer to Section Appendix 9.5B-2.

APPENDIX 9.5D - RESPONSES TO QUESTIONS CONTAINED IN THE NRC'S LETTER DATED OCTOBER 18, 1979 FROM OLAN D. PARR TO UNION ELECTRIC COMPANY

(Note that all section and page numbers referenced by the NRC as Enclosure 1 in the questions contained in this appendix refer to the first revision of the Standard Plant Fire Protection Report, dated May 3, 1978. Those referenced by the NRC as Enclosure 2 refer to responses contained in ULNRC-254 dated May 3, 1978).

Appendix 9.5D (Sheet 2)

Enclosure 1,
Item 2

Page 9.5A-4

Your response to Section B of BTP 9.5-1, Appendix A, "Administrative Procedures, Controls and Fire Brigade" is adequate. Confirm that you will follow the staff supplemental guidance contained in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance," dated June 14, 1977.

Response

We will follow Attachments 1 through 5 of the staff supplemental guidance contained in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance" as received in the NRC letter from D. B. Vassallo dated August 29, 1977. These attachments concern the fire protection organization, fire brigade training, control of combustibles, control of ignition sources, and fire fighting procedures.

Attachment 6 concerns Quality Assurance for fire protection, which was the subject of separate correspondence. Refer to SLNRC 80-25 dated May 27, 1980 for clarifications to our commitment to Attachment 6. The formal commitment to the Fire Protection QA Program is located in FSAR Site Addendum, Appendix 9.5-A. This revision updates Appendix 9.5-A to reflect the commitments contained in the above referenced letter.

Enclosure 1,
Item 6

Page 9.5-6a (Safety Evaluation Two)

You state that in most areas of high fire loading, a backup system will be available in case of failure of the primary suppression system in a given area. However, the backup system is a portable extinguisher or a hose station. It is our position, as stated in E.3(d) of Appendix A, that portable extinguishers, due to their limited capacity and effectiveness, are not considered as secondary protection. Hose stations should be provided so that all areas of the plant can be properly protected. Revise your design accordingly.

Response

Refer to Section Appendix 9.5B-1

Appendix 9.5D (Sheet 3)

Enclosure 1,
Item 8

Page 9.5A-23

Verify that self-contained breathing apparatus will have at least two extra air bottles located on site for each unit. Also it is our position, as stated in section D4(h) of Appendix A, that you should provide an onsite 6 hr. supply of reserve air so arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. State your intent with regard to this position.

Response

Refer to Section 9.5.1.8

Enclosure 1,
Item 9

Page 9.5A-27, Item (b)

Your response is incomplete. It is our position, as stated in Section E3(b) of Appendix A, that all control and sectionalizing valves in the fire water system should be electrically supervised. The signal should indicate in the control room. Otherwise, a management supervision program should be provided. Such a program should include locking valves open with strict key control, tamper proof seals, and periodic visual check of all valves. Revise your design accordingly.

Response

Refer to Section Appendix 9.5A.E.3.(b)

Enclosure 1 ,
Item 12

Page 9.5A-41

It is our position, as stated in Section F11 of Appendix A, that both early warning fire detection with alarm and annunciation and hose stations be provided for protection of the essential service water pumphouse in addition to the proposed fire extinguishers. Revise your design accordingly.

Response

Refer to the response to Item 6.

Enclosure 1 ,
Item 13

Page 9.5A-44, Welding and Cutting, Acetylene

Oxygen Gas System

You indicate that portable extinguishers and hose stations are provided for the storage locations of welding and cutting, acetylene oxygen gas systems. This provision is unacceptable. It is our position, as stated in Section D2(b) of Appendix A, that gas cylinder storage locations should not be in areas that contain or expose safety-related equipment or the fire protection systems that serve those safety-related areas. A permit system should be required to use this equipment in safety related areas of the plant. In addition, storage locations should be chosen to permit fire protection by automatic sprinkler systems. Local hose stations and portable equipment should be provided as backup. Revise your design accordingly.

Response

Refer to Section Appendix 9.5-A.D.2.(b) and 9.5-A.G.1

Enclosure 2,
Callaway Plant Item 1

The response to Item 2 in the Callaway submittal is not clear. While providing a general commitment to related portions of the overall QA program described in Chapter 17 of the Callaway PSAR Addendum, the submittal then limits the commitment such that the general commitment appears meaningless. With respect to the site-engineering activities, the application of part 17A of the Callaway PSAR Addendum is not clear. With respect to the construction activities, the application of part 17B of the Callaway PSAR Addendum is not clear. Finally, the limiting commitments still do not appear to be completely responsive to Mr. Vassallo's letter of August 29, 1977. Clarify these points.

Response

ULNRC-254 dated May 3, 1978 had transmitted Union Electric's response concerning the quality assurance program for fire protection. This information was included in Appendix 9.5-A of the Callaway FSAR Site Addendum, Revision 0.

Since submittal of Revision 0 of the FSAR the fire protection QA program has been the subject of separate correspondence with the NRC. Refer to SLNRC 80-25 dated May 27, 1980 for clarifications to our commitment to Attachment 6 of Mr. Vassallo's letter of August 29, 1977. Revision 1 updated Appendix 9.5-A to reflect the commitments contained in SLNRC 80-25.

Enclosure 2,
Callaway Plant Item 2

The response to Item 3 in the Callaway submittal is not satisfactory. Our question related to the offsite responsibility for the Fire Protection Program. Therefore, indicate the offsite upper level management position that has the responsibility for the Fire Protection Program.

Response

Refer to Section Appendix 9.5-A.A.1

APPENDIX 9.5E - FIRE PROTECTION EVALUATION

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A.	Water Supplies For Fire Suppression Systems	
1.	Two separate water supplies shall be provided to furnish necessary water volume and pressure to the fire main loop. Each supply shall consist of a storage tank, pump, piping, and appropriate isolation and control valves. These supplies shall be separated so that a failure of one supply will not result in a failure of the other supply.	Complies. Two separate 300,000 gallon maximum capacity tanks are furnished. The tanks are interconnected so that three pumps can take suction from either/or both of the tanks. Check valves are provided so that a leak in one tank or its supply piping does not cause both tanks to drain.
2.	Each supply of the fire water distribution system shall be capable of providing for a period of 2 hours the maximum expected water demands as determined by the fire hazards analysis for safety-related areas or other areas that present a fire exposure hazard to safety-related areas.	Complies. Each fire water tank is capable of providing for a maximum water demand for any safe shutdown area. This is based on 1,160 gpm to the largest safe shutdown area.
3.	When storage tanks are used for combined service water/fire water uses the minimum volume for fire uses shall be ensured by means of dedicated tanks or by some physical means such as vertical standpipe for other water service.	Complies. The fire protection system water storage is not interconnected with any sanitary or service water storage systems.
4.	Other water systems used as one of the two fire water supplies shall be permanently connected to the fire main system and shall be capable of automatic alignment to the fire main system.	Complies. The fire water supply system is not common with any other system.
B.	Sectional Isolation Valves	

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Sectional isolation valves such as post indicator valves or key operated valves shall be installed in the fire main loop to permit isolation of portions of the fire main loop for maintenance or repair without interrupting the entire water supply.	Complies. Post indicator valves are provided to isolate portions of the main for maintenance or repair without shutting off the entire system.
C. Hydrant Isolation Valves	
1. Valves shall be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.	Complies. The lateral to each hydrant from the fire main is furnished with a curb valve, for isolation of damaged hydrants without reducing the effectiveness of the supply system.
E. Hydrostatic Hose Tests	
Fire hose shall be hydrostatically tested at a pressure of 150 psi or 50 psi above maximum fire main operating pressure whichever is greater. Hose stored in outside hose houses shall be tested annually. Interior standpipe hose shall be tested every three years.	Complies. Fire hoses in safety-related areas are tested at a pressure of 250 psi or at the service test pressure stenciled on the hose. Interior standpipe hoses are tested 5 years from installation and three years thereafter. Fire hoses stored outside are not required to ensure nuclear safety or safe shutdown of the plant, as documented by the fact that Standard Plant FSAR Table 9.5.1-2 does not address outside hose.
F. Fire Brigade	

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1.	A site fire brigade trained and equipped for fire fighting shall be established to ensure adequate manual fire fighting capability for all areas of the plant containing structures, systems, or components important to safety. The fire brigade shall be at least five members on each shift.	Complies. The Callaway fire brigade trained and equipped for fire fighting will be established to ensure adequate manual fire fighting capability for all areas of the plant. The fire brigade consists of a fire brigade leader and a 4 man fire team per shift.
2.	The brigade leader and at least two brigade members shall have sufficient training or knowledge of plant safety-related systems to understand the effects of fire and fires suppressants on safe shutdown capability.	Complies. The brigade leader and at least two brigades members per shift shall have sufficient training in or knowledge of plant safety-related systems to understand the effect of fire and fire suppressants on safe shutdown capability.
3.	The qualification of fire brigade members shall include an annual physical examination to determine their ability to perform strenuous fire fighting activities.	Complies. To qualify as a member of the Callaway Plant fire brigade, an individual must successfully complete an annual physical examination to ensure his ability to perform strenuous fire fighting activities.
4.	The Shift Supervisor shall not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety-related systems.	Complies. The Operating Supervisor is designated fire brigade leader.

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5.	The minimum equipment provided for the brigade shall consist of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment and portable extinguishers.	Complies. The minimum equipment provides for the Callaway Plant fire brigade consists of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers.
6.	Self-contained breathing apparatus using full-face positive-pressure masks approved by NIOSH shall be provided for fire brigade, damage control, and control room personnel. At least 10 masks shall be available for fire brigade personnel. Control room personnel may be furnished breathing air by a manifold system piped for a storage reservoir if practical. Service or rated operating life shall be a minimum of one-half hour for the self-contained units.	Complies. Self-contained breathing apparatus, approved by NIOSH, are provided for selected fire brigade, emergency repair personnel and control room personnel. Rated operating life for self-contained units shall be one-half hour. At least 10 masks will be available for fire brigade personnel.
7.	At least two extra air bottles shall be located on site for each self-contained breathing unit. In addition, an onsite 6 hour supply of reserve air shall be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned.	Complies. Two extra air bottles are provided for each self-contained breathing unit to be used by Fire Fighting, Emergency Control, or Control Room personnel. An addition on site 6 hour supply of reserve air is provided to permit quick and complete replenishment of exhausted supply air bottles.
I.	FIRE BRIGADE TRAINING	
1.	Instruction	
a)	The initial instruction shall include	This instruction includes
1.	Indoctrination of the plant fire fighting plan with specific identification of each individual's responsibilities.	Complies. Review of Callaway Fire Protection Program with coverage of each individual's responsibilities.

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2.	Identification of the type and location of fire hazards and associated types of fire that could occur in the plant.	Complies. Identification of flammable materials and substances along with their location within the plant and its environ. Identification of the types of fires that could occur within the plant and its environ.
3.	The toxic and corrosive characteristics of expected products of combustion.	Complies. The toxic, radiological and corrosive characteristics of products of combustion.
4.	Identification of the location of fire fighting equipment for each fire area and familiarization with the layout of the plant including access and egress routes to each area.	Complies. Identification of the location of onsite fire fighting equipment and familiarization with the layout of the plant including ingress and egress routes to each area.
5.	The proper use of available fire fighting equipment and the correct method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modifications (welding) and record file fires.	Complies. The proper use of fire fighting equipment and the correct method of fighting each type of fire, including electrical fires, cable and cable tray fires, hydrogen fires, flammable liquids, waste/debris fires, fires involving radioactive materials and record file fires.
6.	The proper use of communication, lighting, ventilation, and emergency breathing equipment.	Complies. The proper use of ventilation, and emergency breathing apparatus.
7.	The proper method of fighting fires inside buildings and confined spaces.	Complies. The proper methods of fighting fires inside buildings and confined spaces.
8.	The direction and coordination of the fire fighting activities (fire brigade leaders only).	Complies. Direction and coordination of fire fighting activities (fire brigade leaders only).

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9.	Detailed review of fire fighting strategies and procedures.	Complies. Review of fire fighting procedures and strategies.
10.	Review of the latest plant modifications and corresponding changes in fire fighting plans.	Complies. Review of fire protection-related plant modifications and changes in fire fighting plans.
b)	The instruction shall be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in a nuclear power plant.	Complies. Classroom instruction and training is conducted by qualified individuals knowledgeable, experienced, and suitably trained in fighting the fires that could occur within the plant and its environs and in using on-site fire fighting equipment.
c)	Instruction shall be provided to all fire brigade members and fire brigade leaders.	Complies. All fire brigade members receive classroom instruction in fire protection and fire fighting techniques, prior to qualifying as members of the fire brigade.
d)	Regular planned meetings shall be held at least every 3 months for all brigade members to review changes in the fire protection program or other subjects as necessary.	Complies. Regular planned meetings of the Callaway Plant fire brigade are held at least quarterly for members to review changes in the Fire Protection Program or other subjects as necessary.
e)	Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a two year period. These sessions may be concurrent with the regular planned meetings.	Complies. Classroom refresher training is scheduled on a biennial basis to assure retention of initial training.
2.	Practice	

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	Practice sessions shall be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire fighting. These practice sessions shall be provided at least once per year for each fire brigade member.	Complies, with following exceptions. Practice sessions are held for fire brigade members on the proper method of fighting various types of fires which might occur in a nuclear power plant. These sessions are scheduled on an annual basis and provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus. These practice sessions shall be provided at least annually for each fire brigade member.
3.	Drills	
a)	Fire brigade drills shall be performed in the plant so that the fire brigade can practice as a team.	Complies, with following exceptions. Fire brigade drills are to be performed in the plant or other acceptable fire training mock-ups.
b)	Drills shall be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each fire brigade member should participate in each drill, but must participate in at least two drills per year.	Complies, with following exceptions. Fire brigade drills are conducted on a quarterly basis at Callaway Plant for each shift fire brigade. Each fire brigade member should participate in scheduled drills but must participate in at least two drills annually.
	A sufficient number of these drills, but not less than one for each shift fire brigade per year, shall be unannounced to determine the fire fighting readiness of plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill shall ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is begun. Unannounced drills shall not be scheduled closer than four weeks.	At least one drill for each shift fire brigade annually shall be unannounced to determine the fire fighting readiness of the Callaway Plant Fire Brigade, Fire Brigade Leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill shall ensure that the responding shift fire brigade are not aware that a drill is being planned until it is begun.

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	At least one drill per year shall be performed on a back shift for each shift fire brigade.	At least one drill annually shall be performed on the back shift for each shift fire brigade.
c)	The drills shall be preplanned to establish the training objectives of the drill and shall be critiqued to determine how well the training objectives have been met. Unannounced drills shall be planned and critiqued by members of the management staff responsible for plant safety and fire protection. Performance deficiencies of a fire brigade or of individual fire brigade members shall be remedied by scheduling additional training for the brigade or members. Unsatisfactory drill performance shall be followed by a repeat drill within 30 days.	Complies. Training objectives are established prior to the drill by Plant Management. Afterwards, to determine how well the training objectives have been met, the drill is critiqued. Unannounced drills shall be planned and critiqued by Plant Management. Performance deficiencies of the Fire Brigade or of individual Fire Brigade members shall be remedied by scheduling additional training for the brigade or members. Unsatisfactory overall drill performance shall be followed by a repeat drill within thirty days.
d)	At 3 year intervals, a randomly selected unannounced drill shall be critiqued by qualified individuals independent of the licensees' staff. A copy of the written report from such individuals shall be available for NRC review.	Complies, with following exceptions. Triennially, a randomly selected unannounced drill shall be critiqued by qualified individuals independent of the Callaway Plant Staff. A copy of the written report from such individuals shall be available for NRC review.
e)	Drills as a minimum include the following	Drill critiques as a minimum include:
1.	Assessment of fire alarm effectiveness, time required to notify and assemble fire brigade and selection, placement, and use of equipment and fire fighting strategies.	Complies. Assessment of fire alarm effectiveness, time required to notify and assemble the fire brigade and the selection, placement, and use of equipment.

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2.	Assessment of each brigade member's knowledge of his or her role in the fire fighting strategy for the area assumed to contain the fire. Assessment of the brigade member's conformance with established plant fire fighting procedures and use of fire fighting equipment including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment, to the extent practicable.	Complies. Assessment of each fire brigade member's knowledge of fire fighting strategy, procedures, and use of equipment in the area assumed to contain the fire.
3.	The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.	Complies. The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The situation selected shall simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment and organize for the fire assuming loss of suppression capability.
4.	Assessment of brigade leader's direction of the fire fighting effort as to thoroughness, accuracy, and effectiveness.	Complies. Assessment of brigade leader's effectiveness in directing the fire fighting effort.

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4.	Records Individual records of training provided to each fire brigade member including drill critiques, shall be maintained for at least three years, to ensure that each member receives training in all parts of the training program. These records of training shall be available for NRC review. Retraining or broadened training for fire fighting within buildings shall be scheduled for all those brigade members whose performances records show deficiencies.	Complies. Records of training for each fire brigade member including drill critiques are maintained to assure that each member receives training in all parts of the program and retains a high level of competence in this activity. These records shall be maintained for three years and shall be available for NRC review. Retraining and broadened training for fire fighting within buildings shall be scheduled for all those brigade members whose records show deficiencies.
K.	Administrative Controls Administrative controls shall be established to minimize fire hazards in areas containing structures, systems, and components important to safety. These controls shall establish procedures to:	Complies. Administrative procedure and controls are established to ensure the reliable performance of fire protection personnel, system, and equipment.
1.	Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases and liquids, high efficiency particulate air and charcoal filters, dry ion exchanges, or other combustible supplies in safety-related areas.	Complies. Govern the proper handling of flammable gases and liquids, HEPA, and charcoal filters, dry unused ion exchange resins and other combustibles in safety-related areas.
2.	Prohibit the storage of combustibles in safety-related areas or establish designated storage areas with appropriate fire protection.	Complies. Prohibit the storage of combustibles in safety-related areas or establish designated storage areas with appropriate fire protection.

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3.	Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood, and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during all phases of operating and especially during maintenance, modification, or refueling operations.	Complies. Govern the handling of and limit transient fire loads such as flammable liquids, wood and plastic materials in buildings containing safety-related systems or equipment. This control requires an inplant review of work activities to identify transient fire loads.
4.	Designate the on-site staff member responsible for the inplant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedure.	Complies. The first line supervisor is responsible for reviewing work activities to identify transient fire loads.
5.	Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit shall be issued to each area where work is to be done. If work continues over more than one shift, the permit shall be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.	Complies. Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit shall be issued for each area where work is to be done. If work continues over more than one shift, the permit shall be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.
6.	Control the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity immediately following completion of the activity, or at the end of each work shift, whichever comes first.	Complies. Minimize waste, debris, scrap, and oil spills resulting from a work activity in the safety-related area while work is in progress and remove the same upon completion of the activity or at the end of each work shift.
7.	Maintain the periodic housekeeping inspections to ensure continued compliance with these administrative controls.	Complies. Govern periodic inspections for accumulation of combustibles and to ensure continued compliance with these administrative controls.

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8.	Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operations (such as lay-down blocks or scaffolding) shall be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials shall be removed from the area immediately following the unpacking. Such transient combustible material, unless stored in approved containers, shall not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting shall be placed in metal containers with tight-fitting self-closing metal covers.	Complies. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operations (such as lay-down blocks or scaffolding) shall be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials shall be removed from the area immediately following the unpacking. Such transient combustible material, unless stored in approved containers, shall not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting shall be placed in metal containers with tight-fitting self-closing metal covers.
9.	Control actions to be taken by an individual discovering a fire, for example, notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.	Complies. Control actions to be taken by the individual discovering the fire such as notification of the Control Room, attempting to extinguish the fire, and activation of local fire suppression systems.
10.	Control actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel, for example, announcing location of fire over PA system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire.	Complies. Control actions to be taken by the Unit Reactor Operator, such as sounding fire alarms, and notifying the Shift Supervisor of the type, size, and location of fire.